

1.) A method of manufacturing a pleated fluid filter including opposed upstream and downstream filter media faces comprising: feeding from a supply zone at least one layer of filter media to a scoring zone to provide spaced score lines on said layer of filter media; feeding said scored layer of filter media to a spacer application zone to selectively form thereon increments of material spaced in such a manner that said formed increments become communicatively facing when said scored layer of filter media is subsequently fed to a pleating zone; and, feeding said filter media with said selectively spaced and formed increments to a subsequent pleating zone to be pleated into a plurality of pleats successively spaced by said communicatively facing increments, said pleating zone including reciprocating means to provide planar pleat flanks with minimum wave formation.

2.) The method of manufacturing a pleated filter of Claim 1, wherein said spaced, formed material applied in said spacer application zone are formed on said filter media layer on said opposed media layer faces in such a manner that communicatively facing increments between successive pleats when said media layer has been pleated in pleated form in said pleating zone are successively spaced apart differing distances so that the pleated filter media can assume pleated filter packs minimizing resistance of the flow.

3.) The method of manufacturing a pleated filter of Claim 2, wherein said pleated filter media can assume a cylindrical cartridge shape configuration when assembled.

4.) The method of manufacturing a pleated filter of Claim 1, wherein said filter media is fed into said subsequent pleating zone in a reciprocating "back and forth" manner to so minimize possible wave contour formation in successive flat, planar pleat flanks and thus to

optimize pressure drop control between said opposed upstream and downstream media faces during filtering operations.

5.) The method of manufacturing a pleated filter of Claim 1, wherein said spaced increments of formed material applied in said spacer application zone are applied to said filter media layer in such a manner that communicatively facing formed material increments result between successive pleats when said filter layer has been pleated in pleated form in said subsequent pleating zone so that successive pleats of said spaced pleats of said upstream and downstream media faces are of substantially equivalent distances apart.

6.) The method of manufacturing a pleated filter of Claim 5, wherein said filter media layer is fed into said pleating zone in a vertical, "up and down", reciprocating manner to so minimize wave contour formation.

7.) The method of manufacturing a pleated filter of Claim 1; wherein said layer of filter media is fed from said supply zone to said forming zone to provide a selectively pervious arrangement of fluid filter media before said filter media is fed to said scoring zone.

8.) The method of manufacturing a pleated filter of Claim 7, wherein said at least one layer of filter media includes synthetic fibrous material.

9.) The method of manufacturing a pleated filter of Claim 8, wherein at least one layer of filter media includes cellulose material.

10.) The method of manufacturing a pleated filter of Claim 7, wherein at least one selected scrim layer is fed to said forming zone as a downstream support layer and a selected fine synthetic filter media material is applied thereto in said forming zone.

11.) The method of manufacturing a pleated filter of Claim 10, wherein said downstream support layer includes synthetic material.

12.) The method of manufacturing a pleated filter of Claim 10, wherein said downstream support layer includes wet-laid material.

13.) The method of manufacturing a pleated filter of Claim 12, wherein said downstream support layer includes cellulose material.

14.) The method of manufacturing a pleated filter of Claim 11, wherein said downstream support layer includes dri-laid material.

15.) The method of manufacturing a pleated filter of Claim 11, wherein said downstream support layer includes spunbond material.

16.) The method of manufacturing a pleated filter of Claim 10, wherein said the selected fine synthetic filter media includes meltblown material.

17.) The method of manufacturing a pleated filter of Claim 16, wherein said the selected fine synthetic filter media includes meltblown material with a selected additive.

18.) The method of manufacturing a pleated filter of Claim 17, wherein said the additive having a fluoro chemical additives to provide water repellency.

19.) The method of manufacturing a pleated filter of Claim 10 wherein said scrim material is in the range of approximately forty (40) to two hundred (200) grams per square meter (g/sq. m.) in basic weight with a fiber size in the range of approximately seven (7) to one hundred (100) micrometers with a Gurley stiffness in the range of thirty (30) to five thousand (5000) grams.

20.) The method of manufacturing a pleated filter of Claim 10, wherein said scrim material is sprayed with a selected hot melt spray of adhesive amorphous material and said filter media material is of a relatively estimated selected weight, fiber, thickness and porosity when applied to said hot melt spray.

21.) The method of manufacturing a pleated filter of Claim 1, said communicatively facing formed material increments being of substantially similar length increment sets with at least one certain select increment of a set being in differing cross-section wherein at least one of certain combined increment can be tapered to provide tapered spacing and an overall geometric configuration conducive to a select geometric filter arrangement.

22.) The method of manufacturing a pleated filter of Claim 1, said communicatively facing formed material increments being in increment sets with at least selected increments of at least one set overlapping selected pleat crests.

23.) The method of manufacturing a pleated filter of Claim 1, said communicatively facing formed material increments being in formed material increment sets with at least selected formed material increments of one set differing in length from at least one of the lengths of other formed material increments in said sets.

24.) The method of manufacturing a pleated filter of Claim 1, said communicatively facing formed material increments being in formed material increment sets with at least one of said selected formed material increments of one set differing in cross-sectional breadth from a cross-sectional breadth of at least one of said other formed material increments in said sets.

25.) The method of manufacturing a pleated filter of Claim 1, wherein said layer of filter media is fed from said scoring zone to an intermediate pleating zone and then to a pleat straightening zone prior to feeding said layer of filter material to said spaced material application zone and to said subsequent pleating zone.

26.) The method of manufacturing a pleated filter of Claim 25, said layer of filter media being passed through at least one heat treating zone prior to passing to said pleat straightening zone.

- 27.) The method of manufacturing a pleated filter of Claim 25, said spacer material application zone including spacer material application on both faces of said layer of filter media.
- 28.) The method of manufacturing a pleated filter of Claim 25, said spacer material in said spacer application zone being polyethylene vinyl acetate in melted form at approximately two hundred fifty (250) degrees Fahrenheit.
- 29.) The method of manufacturing a pleated filter of Claim 25, including passing said spacer material treated layer of filter media into a temperature control zone to maintain said applier spaced material above spacer material crystallization when passed to said subsequent pleating zone.
- 30.) The method of manufacturing a pleated filter of Claim 25, said subsequent pleating zone including a reciprocating substantially vertical first pleat forming enclosure to receive said layer of material in a “back and forth” manner to minimize wave contour formation in successive flat planar pleat flanks.
- 31.) The method of manufacturing a pleated filter of Claim 30, said first substantially vertical pleat forming enclosure being followed by a horizontally moveable pressure yielding second vertical enclosure to be communicably positioned relative said first enclosure to receive a selected portion of said pleated material formed in said first enclosure.
- 32.) The method of manufacturing a pleated filter of Claim 25, said subsequent pleating zone including a pivotal inclined reciprocating conveyed mechanism to receive said layer of filter media in a “back and forth” pleating manner to minimize wave contour formation in successive flat planar pleat flanks.
- 33.) The method of manufacturing a pleated filter of Claim 25, said subsequent pleating zone including a pair of combined reciprocating pleat feeding rollers to feed said filter

media in a "back and forth" pleating manner to minimize wave contour formation in successive pleat flanks.

34.) The method of manufacturing a pleated filter of Claim 1, wherein said material formed increments are formed in said spacer application zone by pressure displacing said layer of filter media.

35.) The method of manufacturing a pleated filter of Claim 34, wherein said pressure displacing is accomplished on opposed upstream and downstream filter media faces in selected manner to provide said communicatively facing increments.

36.) A pleated fluid filter arrangement comprising: at least one layer of fluid filter media pleated into a plurality of longitudinally extending adjacent opposed successive pleat flanks of selected depth and spacing between successive pleat flanks to provide spaced upstream and downstream filter face crests; said successive pleat flanks having minimal wave formation and being spaced by communicatively facing increments of spaced formed material increments extending in selected lengths between said spaced upstream and downstream filter face crests.

37.) The pleated fluid filter arrangement of Claim 36, said increments of said spaced formed material increments being selected from a suitable fluid pliable adhesive.

38.) The pleated fluid filter arrangement of Claim 36, said communicatively facing increments of said spaced formed material increments being of selected thickness so that the distance between adjacent successive pleat flanks and between said spaced upstream and downstream filter face crests is substantially equal.

39.) The pleated fluid filter arrangement of Claim 38, said adjacent successive pleat flanks being of a substantially uniform level geometric configuration to minimize wave

formation and to minimize fluid pressure drop between said spaced upstream and downstream media faces during filtering operations.

40.) The pleated filter arrangement of Claim 36, said fluid filter media comprising at least one layer of selected scrim material serving as a support layer and a selected fine synthetic filter media material applied to said selected scrim material.

41.) The pleated filter arrangement of Claim 40, said scrim material is in the range of approximately forty (40) to two hundred (200) grams per square meter (g/sq. m.) in basic weight with a fiber size in the range of approximately seven (7) to one hundred (100) micrometers with a Gurley stiffness in the range of thirty (30) to five thousand (5000) grams.

42.) The pleated filter arrangement of Claim 40, wherein said scrim material includes with a selected hot melt spray of adhesive amorphous material and said filter media material is of a relatively estimated selected weight, fiber, thickness and porosity when applied to said hot melt spray coating.

43.) The pleated filter arrangement of Claim 36, said communicatively facing increments being in the form of substantially similar length increment first and second sets with at least one of said sets having a substantially uniform cross-section with at least one certain select increment of said other set being of differing cross-section wherein at least one certain pair of communicatively facing increment is tapered to provide tapered spacing and an overall geometric configuration conducive to a select geometric configuration.

44.) The pleated filter arrangement of Claim 36, said communicatively facing formed material increments being in increment first and second sets with at least selected increments of at least one set overlapping with respect to selected pleat crests of said other set.

45.) The pleated filter arrangement of Claim 36, said communicatively facing formed material increments being in formed material increment first and second sets with at least selected formed material increments of one set differing in length from at least one of the lengths of other formed material increments in said sets.

46.) The pleated filter arrangement of Claim 36, said communicatively facing formed material increments being in formed material increment first and second sets with at least one of said selected formed material increments of one set differing in cross-sectional breadth from a cross-sectional breadth of at least one of said other formed material increment of said other set.

47.) The pleated filter arrangement of Claim 36, said communicatively facing formed material increments being pressure displaced increments.

48.) The pleated filter arrangement of Claim 40, wherein said at least one layer of filter media is of synthetic fibrous material.

49.) The pleated filter arrangement of Claim 48, wherein at least one layer of filter media is of cellulose material.

50.) The pleated filter arrangement of Claim 40, wherein at least one selected scrim layer has been fed to said forming zone as a downstream support layer and a selected fine synthetic filter media material has been applied thereto.

51.) The pleated filter arrangement of Claim 50, wherein said downstream support layer includes synthetic material.

52.) The pleated filter arrangement of Claim 50, wherein said downstream support layer is of wet-laid material.

53.) The pleated filter arrangement of Claim 50, wherein said downstream support layer is of cellulose material.

54.) The pleated filter arrangement of Claim 50, wherein said downstream support layer is of dri-laid material.

55.) The pleated filter arrangement of Claim 50, wherein said downstream support layer is of spunbond material.

56.) The pleated filter arrangement of Claim 50, wherein said the selected fine synthetic filter media is of meltblown material.

57.) The pleated filter arrangement of Claim 56, wherein said the selected fine synthetic filter media being is meltblown material with a selected additive.

58.) The pleated filter arrangement of Claim 57, wherein said selected additive is a fluoro chemcial additive to provide water repellency.